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AUTHOR Polk, Barbara B.
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ABSTRACT

Designed as a resource for administrators and faculty considering the implementation of competency-based vocational education (CBVE), this report addresses the theory and practice of CBVE, the pros and cons of a competency-based approach to instructional organization and delivery, and concerns about CBVE's appropriateness in Hawaii. After introducing the historical antecedents of CBVE, the first section defines the concept; enumerates the characteristics of an individualized, self-paced, open-entry/open-exit, competency-based program; and discusses the instructor's role in CBVE. The second section describes the CBVE programs offered by Central Community College (Nebraska), South Oklahoma City Junior College, the Employment and Training Office (Hawaii), and Hennepin Technical Institute (Minnesota). The advantages claimed for CBVE are discussed in the third section, along with related potential problems and the findings of available research on the method's effectiveness. After warning of the unwiseness of a total commitment to wholly individualized CBVE in Hawaii at this time, the fourth section identifies the concepts and procedures that can be borrowed from the CBVE model to improve instruction. This section explores myths about CBVE, offers suggestions for developing a CBVE course or program, and reviews the procedural modifications necessary to implement such courses. The report concludes with a cautious, positive assessment of CBVE's potential in Hawaii. (AYC)

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COMPETENCY-BASED VOCATIONAL EDUCATION:

Analysis of an Educational Bandwagon and Implications for Hawaii's Community Colleges

Dr. Barbara B. Polk

University of Hawaii
Office of the Chancellor for Community Colleges

September 1982

The project reported herein was performed pursuant to a grant from the U.S. Office of Education, Department of Health, Education, and Welfare. However, the opinions herein do not necessarily reflect the position or policy of the U.S. Office of Education. No official endorsement by the U.S. Office of Education should be inferred.

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Preface

The Community Colleges of the University of Hawaii are continually seeking to find ways to improve instruction and improve the quality of the graduates we supply to the State. In this search, most colleges have begun to look at competency based education as a means of instructional organization and delivery which may improve both the efficiency and the quality of our instructional programs. In particular, the Employment Training Office provides a local model for CBVE as outlined in this report. In addition, Kapiolani Community College has made a major commitment by defining competencies for each of its programs and courses.

This report on competency based vocational education provides a thorough examination of both the theory and practice of CBVE. It considers the pros and cons of a competency based approach to instructional organization and delivery and addresses some of the most frequently heard concerns about whether CBVE is appropriate in Hawaii. As such, the report provides a resource for programs and faculty considering implementation of CBVE.

As we move through a difficult decade, I encourage our colleges to continue to implement CBVE wherever appropriate. Although CBVE, like any other innovation in instruction, cannot be a panacea, it holds a promise which we must not lightly dismiss.

The impetus for the need of this report was provided by Dr. Lawrence Wakui and I am taking this opportunity in recognizing his input to this project.

Dewey H. Kim
Chancellor for Community Colleges

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COMPETENCY-BASED VOCATIONAL EDUCATION:

Analysis of an Educational Bandwagon and Implications for Hawaii's Community Colleges

What Is Competency Based Education?

Introduction and Historical Antecedents:

Competency-based education has been hailed as the educational reform movement of the 70's and 80's. Responding to public concern for accountability, high schools, technical schools, community colleges, teacher education programs, four-year colleges and various professional programs have struggled to define the skills and abilities required of their students in the real world roles to which they aspire. and to organize instruction around the competencies so identified. An ERIC search on the term "competency-based education" uncovers more than 2,500 entries, including attempts by more than half the states to define minimal competencies for high school graduation; an extensive literature on competency-based teacher education; and hundreds of in-house documents listing competencies, telling how to write competencies and evaluate them, and describing the proposed or actual implementation of competency-based education programs.

Despite the intense activity on behalf of competency-based education (CBE) in the past decade, the concepts which underlie it are not new. Grant (1979) points out that the concerns expressed by and through the CBE movement in higher education parallel those which occurred within secondary education during the first decades of the 20th century when the nearly ten-fold increase in the number of high school students brought an influx of "new students" similar to those who have entered higher education in the past two decades. In both time periods, modification of educational systems to serve large masses raised questions concerning the appropriate aims and outcomes of education, along with attention to the efficiency of educational institutions.

In its attempts to improve the efficiency and effectiveness of education, CBE draws on a long chain of behavioral and functional antecedents, beginning with Frederick Taylor's approach to scientific management at the turn of the century, an approach which included the first discussion of job analysis (1911). Influenced by Taylor and by his own experiences in training industrial personnel, Charles R. Allen, in his book, The Instructor, the Man and the Job (1916), outlined an approach to occupational training which sounds remarkably like contemporary discussions of competency-based vocational education. Starting with a "trade analysis" to determine the skills to be taught- he advocated the careful organization of these skills into learning units or "blocks." Within and between blocks, careful attention is given to establishing an order of instruction based upon difficulty level and prerequisite knowledges and skills required. In addition, Allen recommended an individualized approach to instruction:

> "Not only should the training work be so organized that a man can be admitted to an instructional group at any time but the organization should be such that each man can progress through the course of training... as rapidly as his individual capabilities will admit." (p.211)

During this same time period in which the rational and efficient organization of education, particularly vocational education, was developing rapidly, there was also an active humanistic opposition to the "efficiency" trend. Chief spokesperson for humanism in education was, of course, John Dewey. Although Dewey's concern with meeting the needs of individual children and encouragement of a project approach and activity based curriculum fit well with the concepts of competency-based education, he strongly challenged the narrowness of focus implicit in the behavioral/functional approach to education. Rejecting education based narrowly on specific preparation for a given job, Dewey argued,

> ". . . such training may develop a machine-like skill in routine lines (it is far from being sure to do so, since it may develop distaste, aversion, and carelessness), but it will be at the expense of those qualities of alert observation and coherent and ingenious planning which makes an occupation intellectually rewarding. In an autocratically managed society, it is often a conscious object to prevent the development of freedom and responsibility; a few do the planning and ordering, the others follow directions and are deliberately confined to narrow and prescribed channels of endeavor." (Dewey, 1916, p.363).

As the University of Hawaii community colleges explore the possible benefits and attractions of competency-based education, it is important to keep in mind Dewey's warning that it is the responsibility of educators to restrain the inclination toward overspecialization which may be a natural tendency of vocationally oriented programs.

In more recent years, a major precursor of CBE was programmed instruction. This approach to instruction, which peaked in the early 1960's, involved the organization of information to be learned into very small sequential steps, with frequent repetition of key ideas and frequent reward for learning each idea. Although the entire methodology proved too expensive and cumbersome to implement and very boring to students, programmed instruction did focus attention on setting objectives for instruction in measurable terms.

The behavioral objective bandwagon was set in motion in 1962 by a little programmed booklet by Robert Mager describing how and why to write measurable instructional objectives. Behavioral objectives proponents claimed two major advantages of their approach: 1) the objectives provided a means to organize instruction by teaching only those things directly related to the prestated objectives, and 2) they provided the only way to assess the effectiveness of the instructional process, since what cannot be measured cannot be said to have been learned. (Popham, 1973, presents a very readable and balanced overview of this movement from the perspective of one who initially embraced it wholeheartedly.) We should note, however, that the "behaviors" which were most often measured were ability to give the requisite number of correct answers to paper and pencil objective tests.

At much the same time as the beginning of emphasis on behavioral objectives, John Carroll's article, "A Model of School Learning," (1963) sent shock waves through primary and secondary education circles by suggesting that given sufficient time, most students could learn anything. As interpreted by Benjamin Bloom, who was greatly influenced by the article, Carroll had claimed that differences in aptitude for learning a given subject were really differences in the amount of time needed to master the subject rather than differences in ability to learn it (Bloom, 1974).

From here, it was only a short step to individualized instruction. If one could specify the desired outcomes of education (the behavioral objectives) and provide means by which students might proceed at their own pace toward those objectives, it should be possible for all students to learn. Postlethwait's audio-tutorial (A-T) approach was one of the first to try (1963). Developed for botany students at Purdue University, A-T made use of learning labs in which students worked individually in study carrels following tape recorded instructions on how to use texts, media material, specimens, equipment and models to reach prestated objectives. In addition, Postlethwait used optional weekly large group sessions for supplementary material and mandatory weekly small quiz sessions in which students were expected to integrate the material learned and come prepared to explain it to others. This approach seems to work well at more elite schools, but Cross reports (1976, p.89) that by the mid-70's, it had made little impact on community colleges.

Although the audio-tutorial approach was highly individualized and provided a variety of ways to learn, it was not structured to ensure that students achieved the objectives. Building on these precursors, by the late 1960's Bloom (1968) and Keller (1968) had simultaneously developed very similar approaches to education which added the concept of mastery. In both Keller's Personalized System of Instruction (PSI) and Bloom's Mastery Learning approaches, students were required to achieve <u>mastery</u> of each sequential objective before being permitted to continue on to the next objective. These systems made certain that students learned to the level of a prestated criterion (theoretically, at least). Both systems, developed originally for use in elementary and secondary education and therefore restricted by the traditional classroom physical and temporal structure, involved setting measurable learning objectives, dividing materials to be learned into blocks or units of one to two weeks in length (for the average student), and providing testing for mastery and recycling through the lesson until mastery was attained. (There are also a number of differences in the approaches which are discussed by Block, 1974). The concepts and procedures of Mastery Learning and PSI form an important core of the movement which has come to be called competency-based education (CBE).

CBE (or performance-based education as it was often called in the 1960's and early 1970's) had its beginning in teacher training programs. Responding to public demands for accountability in education, colleges of education began to frame their curricula in terms of behavioral objectives. However, it soon became clear that while a teacher might be able to list five ways of eliciting discussion in a class, she/he might be totally incompetent at leading a class discussion. The contribution of CBE, then, was to define actual on-the-job teacher behaviors which were to be learned and to develop means of evaluation which involved demonstration of competence in <u>performing</u> the behavior. In

other words, colleges moved away from ensuring that students acquired knowledge of teaching techniques toward ensuring that graduates would be competent to perform in the classroom.

Although the concepts of CBE were picked up by a few other vocational and professional training programs, its impact on higher education probably would not have been so great if it had not been for the Fund for the Improvement of Postsecondary Education (FIPSE) which in 1974 designated CBE as a "special focus" (Gamson, 1979). Not only did FIPSE fund a variety of new and continuing projects in CBE in community and four-year colleges throughout the country, but FIPSE staff, traveling the country to monitor projects, provided cross-fertilization of ideas and a wider dissemination of enthusiasm for the concept.

Today, colleges and technical schools in every part of the country are implementing CBE, especially in vocationally oriented programs and in other skill areas, such as math, writing and some sciences. In general, the movement has been slow to catch on in liberal arts areas, apparently for good reason — the objectives of education in the liberal arts are rarely abilities to perform tasks, but rather the acquiring of certain facts and concepts and the ability to make limited analyses using a new conceptual framework. The real skills of the liberal arts are generally taught at the graduate level with beginning students getting only a quick overview of a discipline.

Because of the difficulty of applying CBE to liberal arts education (although see Grant, et. al., 1979, for some notable attempts), this paper will focus on its applicability to vocational programs. For that reason the acronym used throughout the rest of the paper will be CBVE for Competency-Based Vocational Education.

Defining Comptency-Based Vocational Education

Although the previous section has discussed the various breakthroughs in educational philosophy and practice which have culminated in CBVE, there is no simple definition in general use. Definitions are as diverse as the individuals and programs attempting to implement CBVE. A brief sample includes:

> "a data-based, adaptive, performance-oriented set of integrated processes that facilitate, measure, record, and certify within the context of flexible time parameters the demonstration of known, explicitly stated and agreed upon learning outcomes that reflect successful functioning in life roles." (Spady, 1977, p.9)
>
> "Competency-Based Education is an educational framework, a way of organizing instruction which affects how curricular and instructional decisions are made. The purpose of CBE is to clearly focus instructional decisions on student achievement of specific skills." (Filan, et. al., 1981, p.2)
>
> "Performance-based vocational education is an educational program in which the tasks (or skills) to be acquired and demonstrated by the students, as well as the criteria (standards) to be applied in

assessing the performance of such tasks (skills), are made explicit in advance of instruction; the student is held accountable for meeting these criteria; and the instruction is organized around those tasks (skills)." (State Department of Education, South Carolina, 1978, p.4).

"1. The skills and knowledges that students learn should be directly related to the duties and responsibilities they will have to perform in the job.

2. These skills and areas of knowledge and the means for evaluating their attainment should be specified in advance and made known to the students.

3. Students should be provided with whatever instructional experiences they need to attain the skills and knowledge required by the jobs they are aiming for." (Career Education Center, Florida State University, 1976)

In fairness, it should be noted that the definitions quoted above are only preliminary statements. In each case, the documents go on to a considerably more detailed discussion of the aspects of CBVE. Though these statements differ, it is clear that all are attempts to define the same educational system. For purposes of this paper, we may draw on the above definitions (and others) and define CBVE as

1) the systematic organization of curriculum and instruction 2) around knowledges, skills and abilities (competencies) 3) which are required on the job; 4) students are informed in advance of the competencies to be acquired and 5) of the means of assessing their attainment, and 6) provided with instructional experiences needed to achieve 7) the required level of mastery of each sequential task before proceeding to the next.

A CBVE program as defined above can operate within any institutional structure. However, pressures intrinsic to competency-based programs move them toward individualized approaches to instruction. If the focus is to be on the outcome of instruction, the competency acquired, rather than on the instructional process itself, we are quickly led to wonder why students should bother working through an instructional unit when they have already acquired the competency involved or why they should wait for others to learn what they have already mastered or why they should not be free to continue work on a task even though other students have already mastered it. All of these questions suggest the close relationship between competency-based instruction and individualization.

Throughout the rest of this paper, the term Competency-Based Vocational Education will generally be used to refer to a competency-based system which is also individualized (exceptions should be clear from context). In order to provide a common framework for the discussion, the following outline contains the major characteristics of a completely individualized, self-paced, open entry/open exit, competency-based program. The model is based heavily upon the system used at Suburban Hennepin Vocational Technical Centers (1981) and that developed by the EPDA Regional Workshop in Lexington, Kentucky (1976).

1. All instruction and degree/certificate requirements are based upon competencies derived from job analyses and kept up to date through frequent consultation with an advisory committee and feedback from employers.

2. Degree/certificate requirements are stated in terms of competencies to be demonstrated rather than in terms of grades or credits amassed.

3. Students do not have to engage in any prescribed set of learning experiences but may demonstrate competencies acquired outside the college or design individual approaches to acquiring competencies.

4. Entering students are provided with diagnostic/assessment services to determine competencies already attained, pre-requisite skills which must be acquired, and general learning strengths and weaknesses and/or learning style.

5. Based upon the diagnostic/assessment results and student statements of objectives, needs and interests. an individualized program is developed in cooperation with a counselor or instructor.

6. All learning experiences are based on competency statements and are fully individualized, normally using modules or learning packages. Several alternative experiences are provided for each competency to allow selection of compatible learning modes. Some of the learning modes may be group modes.

7. Instructors and other resource persons are always available to assist students, answer questions, critique performance, and suggest additional learning experiences as students work with the learning activities.

8. The student works through the learning modules by taking pretests, engaging in the learning activities specified upon analysis of the pretest, and demonstrating competency on an evaluation.

9. Wherever possible, evaluations are based on performance of job-related tasks rather than on knowledge about a task.

10. If the student does not successfully demonstrate a competency she/he repeats the learning cycle, perhaps utilizing alternative materials or learning modules for those areas in which mastery is not complete. The student may continue to repeat the cycle until mastery of the competency is demonstrated.

11. When a student demonstrates mastery of a task, she/he proceeds immediately to the next task.

12. Time is not a factor in a student's progress; demonstration of mastery of each competency is the goal.

13. Students may work with a counselor or instructor to replan their program at any time, based upon personal development, needs determined by experience in the program, and changes in interests and objectives.

14. Students receive credit for competencies achieved. Students not meeting the mastery requirements have nothing entered on their transcripts.

15. Upon completion of a program, a student is awarded a certificate or degree stating the competencies attained. The official transcript also contains a more detailed record of the competencies attained.

The complete individualized CBVE model is indeed intimidating! However, as we shall see in a later section, it is not necessary to implement the entire model in order to use CBVE concepts to improve education.

Instructor Role in CBVE

The model in the preceding section presents CBVE from the point of view of the outside observer. However, the effectiveness of CBVE depends upon the activities of the instructor, activities which vary substantially from those in a traditional course. As Grant (1979) states,

> "It goes to the root of the relationship between faculty and students and requires faculty members to rethink their role. Even tenured faculty . . . must learn to be competent at new skills. They must move away from the lectern and learn to teach in other settings and in other forms of interaction with students . . . ." (p.13).

Cross (1976) points out that in individualized instruction, "the teacher assumes the role of manager; he or she prepares materials, diagnoses, prescribes, motivates, and serves as a resource for the student." However, Farley and Moore (1975) point out that "individualized instruction through learning packages calls not for a change in the things a teacher normally does, but a change in the 'mix' or the frequency with which he or she does them." (p.10) Let us look at some of the components of the new mix of faculty activities.

In a CBVE setting, the major information which is usually conveyed to students in a classroom via lecture or demonstration will now be presented in learning packets which contain instructions for the individual use of text material, faculty prepared written material, and information presented through various A-V media. A major faculty activity in a CBVE system, then, is the development, selection, and revision of learning packets and individualized materials. Although this activity is similar to the processes involved in selecting texts and audio-visual materials for a class, and in staying current with the field and revising lecture notes, the development and revision of learning packets is more time consuming than the preparation or revision of a lecture. Revision of learning packets may include writing explanations, developing self-assessment tests, or working with media personnel to produce audio or video tapes, photographs or slides. Although the major production work is done at the time the CBVE course is first developed, changes in occupational requirements as well as identification of student learning problems require frequent updating and modification.

With the learning packet and its associated materials replacing the lecture and other forms of group instruction, the instructor's direct instructional activities are largely one to one. While students are studying, the instructor

is available to answer questions, clarify information, provide supplementary insights on the topic. help solve problems, and provide direct instruction and supervision in the performance of applied tasks. Instructors do not necessarily wait for students to come to them, but "make the rounds" checking on student progress and offering assistance. In this way, the instructor spends less time performing and more time observing student performance.

The faculty role in a CBVE system also involves an increase in the amount of time spent on assessment and evaluation of student performance. Because students progress on the basis of demonstrating mastery of each competency, faculty must devise a variety of assessment measures with special emphasis on performance of job-related tasks rather than success on paper and pencil tests. Developing such performance-based measures and keeping them up to date with changing job requirements demands considerable time and effort. In addition, much of the time spent in interaction with students may be in evaluation since performance is assessed individually and more frequently in CBVE programs.

To be effective in a CBVE instructional setting, then, instructors must be or become proficient at selection of materials; development of learning packets, including locally produced A-V materials; development of evaluation procedures for job-related performance tasks; and one-to-one tutorial interactions with students, including assisting students in identifying their learning problems, suggesting activities to overcome problems or expand understanding, answering questions, clarifying information and procedures, evaluating performance and diagnosing problems. Lastly, instructors must develop substantial flexibility in moving back and forth between different subject matters and different levels of student knowledge since the instructor may have students from several different classes working in the same room at the same time, requesting help with their individual learning activities.

Models of CBVE

In order to avoid over commitment to an idealized version of CBVE, let us turn now to several examples of CBVE in practice. This section will describe four institutions, all of which use some version of CBVE throughout their entire curriculum. The first three, Central Community College in Hastings, Nebraska, South Oklahoma City Junior College, and Employment Training Office in Honolulu are described on the basis of first hand observation. The fourth model, Hennipen Technical Institute, is included briefly because it has become so familiar to many persons in Hawaii through workshops and visits.

Central Community College in Hastings, Nebraska (hereafter referred to as Hastings), offers mostly vocational programs with liberal arts courses serving primarily as vocational support (although many liberal arts courses transfer for university credit). The college enrolls approximately 1,800 on-campus day students as well as 2,500 off-campus students and a small number of on-campus evening students. All courses in the college are individualized such that a student can begin any course on any day the college is in session. However, the college operates on a semester system (primarily to provide accountability comparisons with other colleges in the state), and students are assigned credits for work completed at the end of each semester. Students may receive credit for any units completed within a course by the end of the semester, but

must re-register for units which are not complete. Although the college was not initially happy with the imposition of the semester system, it has proven effective in motivating students to complete their work so that they will not have to sign up and pay a second time for incomplete units. In addition, the college motivates students to progress at a reasonable rate with a very strict probation/suspension policy which requires that a specified proportion of credits attempted be completed in any semester.

Each instructor determines the number of students he or she can handle at one time. A card file in the registrar's office holds a card for each available opening in each instructor's lab. Students may enroll for any course taught by that instructor until all the lab cards for each time period (usually a three to four hour morning or afternoon block of time) are taken. Students enrolling when a lab is full must wait until another student completes a course or withdraws in order to enter that lab. In practice, the college is usually able to accommodate new students in the labs of their choice.

In the lab itself, which may be a shop, computer room, business machines area, etc., the instructor supervises students working on several different courses within the same time block. The entering student fills out an information card, is given the course outline sheet, and is shown the location of the course information sheets. Each course has an orderly sequence of written information sheets which together comprise what is known as a learning packet at other colleges. At Hastings, the students begin by reading the course outline and the statement of course objectives (competencies) and proceed to the Study Guide. The Guide tells students what to do to achieve each objective of the course. There are normally one to three units of work for each credit, with several competencies for each unit. Normally, however, evaluation takes place at the end of each unit for all competencies within that unit rather than by checking off each competency as it is completed. The student works individually, following the directions of the Study Guide and seeking out the instructor for assistance as needed or for evaluations as directed by the Study Guide.

Study Guides direct students to a variety of materials, including texts and workbooks, other written references, commercial films and film strips, etc. In addition, the college relies heavily on film strips which they have developed as well as video tape (when the content requires motion), and combination audio tapes and photograph flip charts. The audio or video tapes are normally no longer than 5 to 7 minutes, with the expectation that students will listen to them two or three times. Most tapes seem to have been constructed very informally — as though the instructor were sitting with an individual student explaining the subject -- rather than as formally scripted lectures.

When not working with a student one-to-one, instructors may be found at "stations" within the lab itself — not in separate offices. The instructor station may be a desk, round table, lectern, or whatever is comfortable for the instructor and approachable for the student who wishes assistance or evaluation. When instructors are at their station, they spend time checking student work, revising curriculum materials, and staying abreast of the literature in their field until approached by students for help. At Hastings, the instructors work a 40 hour week and spend at least 32 hours in the lab with the students.

Students are not graded in most courses -- they receive credit for courses completed. However, the college has recently recognized that there are quality differences among students which are of interest to employers. Therefore, they have begun development of a list of 12 to 18 competencies per program. Upon program completion, students are rated on these competencies by instructors (usually based on records kept as students progressed through the program) and the ratings appear on the back of the diploma.

Hastings does no pre-testing of students. If instructors notice deficiencies in new students, they request testing by the counselor assigned to the program and remedial work may be prescribed. If a student already has mastered certain competencies, she/he can arrange to be evaluated on them and move quickly to areas of new learning. One of the advantages of a fully individualized college is that students can drop courses for any reason at any time and pick up another course more suited to their present needs or interests. They are not penalized by having missed the "beginning of the class" or having to wait until the next semester to begin.

When the college opened its doors ten years ago, most of the vocational faculty were hired from industry rather than from education. As a result, they established the individualized program from the beginning on the basis of their knowledge of work requirements. Now, advisory committees work with the program faculty to keep requirements current. They have been particularly active in validating the competency statements that will be included on the back of the diplomas.

South Oklahoma City Junior College (SOCJC), like Hastings, opened its doors about 10 years ago with the intention of being a truly innovative college. While Hastings describes itself as "individualized", SOCJC describes itself as "competency based". Although SOCJC eventually hopes to individualize all its courses, at present many courses are taught as regular classes. Actually, the college offers three learning modes: individually paced, group paced, and mixed paced. The first two should be self explanatory; in the mixed paced class, students may proceed individually as long as they stay ahead of the class. If they drop behind, they must attend regular group classes. College personnel believe that these options allow students to select the learning mode in which they are most comfortable. In addition, the college seeks to provide multiple options within the individualized courses, so that students may learn from print or various non-print media. In fact, the library appears to have a larger collection of non-print than print materials.

Regardless of the mode in which a class is taught, students all purchase learning packets for each course which clearly state in advance the competencies to be attained and the means of evaluation to be used. As with the Study Guides at Hastings, the learning packets spell out the sequence of steps for attaining competence in each area and the learning materials and alternatives available. Grading is three tiered instead of having only a grade of Credit, as did Hastings. Students select the competency level they wish to achieve: Credit (about equal to a 2.0 on a four point scale), Mastery (equal to about 3.3) or Honors (equal to 4.0). Requirements differ for each level. Normally students are required to complete each course in their major at the M level. This grading system is one way of avoiding the erosion of academic standards which is a possible by-product of the Credit/No Credit approach. Students have an incentive to pursue higher levels of achievement.

Faculty teaching load at SOCJC is negotiated individually with each instructor; however, faculty are normally expected to be on campus and available to students about 30 hours a week. The college operates on a quarter system with three additional mid-quarter entry points to accelerated classes. Only certain courses, including limited numbers of individualized courses, are offered at any one time. Since most courses meet in normal classes and shop or lab sections for approximately the same number of contact hours as do vocational courses in Hawaii, faculty are available to students primarily during the regularly scheduled class times and office hours. Instructors do not normally have students from several classes in the same area at the same time (as is the norm at Hastings), although some instructors are experimenting with this approach. When faculty are not in class, they are in offices which are separate from the class area, although one of the uniqueness of SOCJC is that there are almost no permanent walls in their buildings and faculty--and administrative personnel--sit fully within view of any passerby, the offices demarked by hip high barriers at most. The theory, apparently borne out in practice, is that faculty are more accessible to students if they are not behind closed doors.

Like Hastings, SOCJC has strict standards of academic progress. Students who do not earn credit for the required percentage of their courses are put on academic probation or suspension. Also, within courses, students may attempt to demonstrate mastery of each competency up to three times, but are not normally permitted to continue with the course if they fail on their third try. Students who do not complete a course during the semester are often required to start at the beginning again when they reenroll (although instructors can and do make other arrangements at their option).

Vocational programs work with advisory committees to stay current with industry. At present, advisory committees are working with faculty to develop program level statements of competencies similar to those under development at Hastings.

SOCJC, like Hastings, does little pre-testing of students, trying to hold the application/admissions/counseling/registration process to two hours for students who come in person to the college. When instructors identify deficiencies, students are referred to the counseling staff or to the math or English learning labs for assistance.

One intriguing aspect of SOCJC is the use of testing centers. The college appears to rely heavily on written tests, virtually all of which are given in test centers, rather than during class time. Thus, when a particular unit is completed in class, each student is responsible for taking the test when she/he is ready and retaking tests on their own schedule. Paraprofessionals are hired to proctor the tests. Usually the test is returned to the instructor for grading, but in some cases the proctor may grade the test on the spot using a key, afterward sending the scored test to the instructor. In this situation, students get immediate feedback and sometimes help in finding supplementary materials if they need to review certain information.

SOCJC is an interesting example of how a competency based program can be implemented with only partial individualization. At this college, students do not have the option of changing courses instantly or starting courses at any time. Nevertheless, the system is organized around competencies and has many opportunities for individualized study.

Employment Training Office (ETO) of the UH comunity college system is a non-credit short-term training program which operates on an individualized, competency based system. Students may enter a training program at the beginning of any week. They proceed through the program of their choice at an individual rate, completing learning contracts which specify the competencies to be attained. Students are responsible for their own progress, although faculty closely monitor their learning rate. Students are not graded, but must reach criterion level on each competency before progressing to the next. Because many of the ETO students have been funded through CETA, faculty are responsible for closer than average monitoring, leading to more detailed use of competency check sheets in the trade and industry areas and more time spent checking student practice assignments in the business programs than was the case at either SOCJC or Hastings.

Students follow a study guide for each of their courses. The guide tells them where to find and how to use materials at each stage of learning, and what skills to practice. In some programs, students take a pre-test before beginning each unit and a post-test at the end. Unlike some individualized programs, ETO has incorporated group instruction into an individualized basic structure. For example, in the Business programs, students are assigned by the study guide to attend mini-seminars. Each mini-seminar is a small lecture or demonstration session which is offered one or more times per week on a schedule available to students. In this way, instructors are able to introduce new subjects to groups of students, rather than explaining difficult things individually. It also allows for greater rapport between students and teacher at the point the student enters.

In the business program, instructors also schedule themselves for testing periods each week. Students who have reached an evaluation point in any class can attend the testing session scheduled by their instructor. Instructors are generally available to students at all times when they are not testing or offering mini-seminars.

Because ETO does not have any semesters or beginning or ending points for classes, students in fact are distributed across all points in a course at any given time. Therefore, ETO instructors, much more so than their counterparts at SOCJC or even Hastings, must be prepared to shift gears each time a student asks for assistance, recalling not only what contract this student is working on, but how far along she/he is and what she/he can be expected to know already.

ETO itself does little pre-testing of students, but relies on the pre-testing and prescriptions of the agencies which refer students. Students who come in on a paying basis are counseled by faculty and placed appropriately in contracts. Students may challenge units if they have already mastered the material and proceed to the next higher level without working through the learning package.

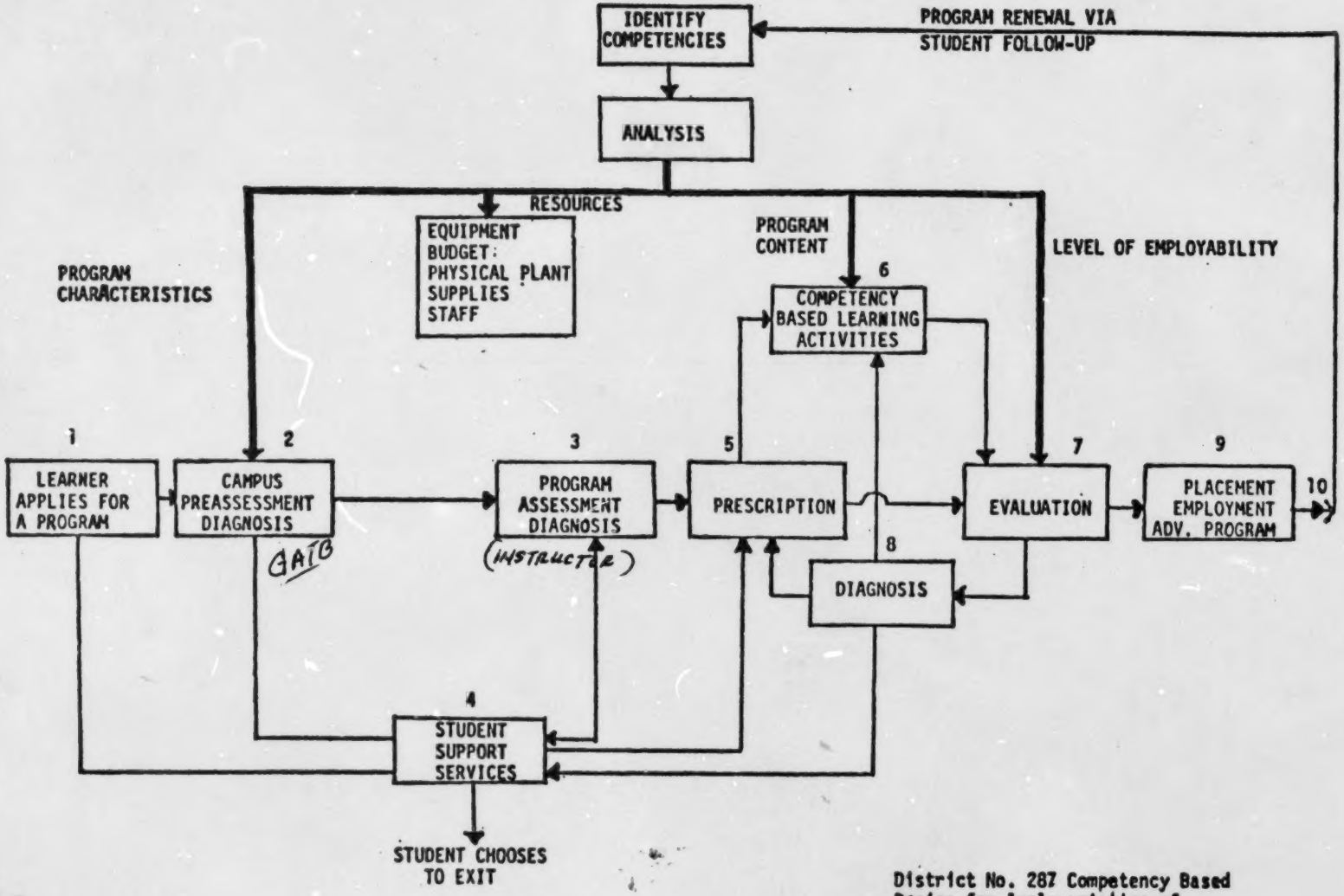
Hennipen Technical Institute in Minnesota is a two-year technical school which enrolls approximately 3000 full-time students and 1000 night students. It is a fully individualized, competency-based program. In many respects, it sounds similar to Hastings. However, there are several aspects of the school's operation which are different from others discussed.

The college has an extensive testing and counseling program which spends at least six hours evaluating students before placing them in a program. Deficiencies are identified in advance and students must complete remedial work prior to entering their chosen vocational program.

Hennipen also has a grading system which is unlike others. Students are rated on each competency using a six point scale which goes from a high of 6--performs task/competency with exceptional ability, to 1—cannot perform task. The ratings help encourage students toward their best possible performance and thus help maintain program standards. However, students are rated separately on each of 50 to 200 competencies in the program, making summary statements somewhat difficult.

Finally, Hennipen utilizes long competency or task lists to monitor the progress of students, checking off each as it is acomplished. In contrast, Hastings and SOCJC tend to look more holistically at student achievement of competencies, evaluating progress less frequently and in greater chunks.

The flow chart on the following page provides an overview of the Hennipen System.



District No. 287 Competency Based Design for Implementation of Individualized Instruction

Evaluating CBVE

Pros and Cons of CBVE:

Now that we have looked at some CBVE programs in action, let us return to a consideration of the ideal individualized CBVE model. Advocates of Competency Based Vocational Education have claimed that the new curricular structure promises great improvements in education. However, many of the advantages of CBVE carry with them potential problems which must be kept in mind in deciding whether or how to implement CBVE. This section addresses the claims made for the system and the related potential problems.

1. CBVE will improve the quality of education; in particular it will improve graduates' ability to perform on the job, since students must work at each task until it is mastered.

   In a CBVE program, students are evaluated against a prestated criterion, rather than being graded relative to a group. Because students cannot get by with C or D grades, but must demonstrate mastery of each task or skill, a CBVE program should result in better prepared students.

   Some critics have suggested, however, that rather than requiring a nigh level of mastery of each skill, processes intrinsic to CBVE will tend to lower academic standards by requiring students to attain a minimal level of competence only. Pressures on colleges to retain students will require that the mastery level be set low enough so that most students will be able to attain it reasonably quickly. At the same time, however, there are no incentives (such as higher grades) for students to achieve more than minimal standards of performance. (See Bell, 1980, p. 18) Any attempt to establish CBVE must deal with this issue directly and find mechanisms to maintain high standards of performance. The SOCJC and Hennipen grading systems are attempts to overcome this problem.

2. CBVE programs provide clear information to the employer (and general public) on what program graduates will be able to do.

   By clearly stating the objectives of the program in behavior terms, CBVE programs let employers know exactly what they can expect of program graduates. Also, by providing a list of competencies, any person (legislator, board member or member of the general public) who questions whether a vocational program is really necessary for particular jobs will be able to assess the depth and variety of skills which the program will impart. In some states, competency statements are expected to be an effective way of winning public support for vocational education.

   Although competency statements clarify what is being taught, it is not clear that they can be guarantees of what a student has learned. Even when students are carefully tested on each skill, there is no way for the college to guarantee that a skill once mastered will be retained or will be performed adequately in a new setting or under different work conditions. Any form of measurement only approximates the conditions of the real world: it provides a sample of behavior at a particular time, but the degree to which this sample may be generalized to other places or

times is unknown. At best, a CBVE program can state that a student has demonstrated the ability to perform each task but it cannot promise that the student will do so on the job. (Bracey, 1973, and Olesen, 1979).

3. CBVE improves the relationship between program and job requirements.

By building the entire program around job related skills and tasks, the CBVE program attempts to prepare students for entry into specific jobs. There are, however, two problems with this assumption. The first is that the amount of individualized material either in print or in A-V form which is necessary for a CBVE program, creates a type of system inertia. While an instructor can make changes quickly and easily in lectures and other group procedures to update the course and take account of changing job requirements, the revision of CBVE materials is considerably more time consuming. Some instructors have found that when a new text is published or a new edition comes out, the effort to change the individualized materials to correspond with the new texts is overwhelming. If outdated texts are retained urtil modifications in the course materials can be made, CBVE programs may get out of date more easily and stay out of date longer than do conventional vocational programs.

A second problem related to linkages between job and program requirements is that the tendency of CBVE programs to de-emphasize knowledge and understanding and to focus on performance of tasks may mean students are well prepared for the job as it is, but ill-equipped to adapt and learn with changes in job requirements. As Bell (1980, p. 14) points out, most learning is directed toward acquiring the basis to facilitate further learning. Unless CBVE programs incorporate competencies which cover broader knowledge and understanding in addition to ability to perform specific tasks to criterion, students may find themselves unable to keep up on the job.

4. CBVE improves the evaluation of program effectiveness by making the goals of the program quantifiable.

Certainly accountability has been one of the major forces promoting the move toward CBVE. When program outcomes are clearly stated, it is possible to report in concrete terms how many students were able to do what things.

Humanists, however, have criticized CBVE for seeking accountability at the expense of that flexibility which is necessary to the educational process. Without the opportunity to change the content of the curriculum, even in small ways, to take into account the composition and needs of a particular class and the changes in job technology, the educational process becomes static and boring, both for faculty and students. The reliance on behavioral objectives hides the fact that education has too many outcomes to specify, and some of what is not specified may be the most important outcomes. As was discussed above, the broader and more nebulous goals of education—those of preparing students to learn new information and adapt to new techniques—may suffer on behalf of a narrowly defined accountability. (Bell, 1980, p. 15)

5. CBVE helps motivate students by providing clear statements of program objectives in advance of instruction and by making clear the connections between job, the competency objectives, instruction, and evaluation.

   The theory is that students will be motivated to pursue their education to the extent that it is clear to them what the expectations of them are and how they will be evaluated.

   Despite this theoretical motivating force, one of the most uniform statements made by faculty involved in CBVE programs is, "It's great for the well-motivated student." In other words, because students must take substantial responsibility for their own learning, success depends heavily upon student motivation (Gamson, 1979, p. 250). Unfortunately, not all students are highly motivated and the motivation provided by clear knowledge of the interrelationships among objectives, instruction and evaluation does not counterbalance the responsibility placed on students by this system.

6. CBVE is democratic. It treats students as individuals and increases the probability that educationally disadvantaged students will complete the program.

   Slower students have greater opportunities to complete the program and attain mastery of the required tasks under CBVE. As a result, CBVE programs are more democratic since they reduce the impact of prior educational deficiencies and of demographic barriers to academic progress. However, unless means can be found to maintain the motivation of slower students, CBVE, like any other system of education, disproportionately benefits the brighter, faster, and more highly motivated student by decreasing the time needed for program completion (Gamson, 1979, p. 250).

   In addition, Riesman (1979), points out that the cost to society of nurturing the "slow but sure" student may be very high. "In fact, the ability to learn quickly may be in and of itself a competence in certain lines of work. Suppression of evidence about the length of time involved in learning competence...will in the long run not prove beneficial to students, to competence-based programs, or to society as a whole." p. 40.

7. CBVE provides students with individual attention. They get the help they need when they need it. Resources are redirected to those students with the greatest need.

   The opportunity for individual attention is one of the greatest assets of the CBVE system. The conscientious faculty member can use individual attention to identify ways to help motivate students as well as to provide individual assistance. Differences in learning style may be identified and alternative learning approaches prescribed.

   However, even this benefit is not quite as strong as it first appears. Much of the instructor's time is diverted from direct instruction, either individual or group, and into preparation and updating of materials and many varieties of paperwork. As pointed out earlier, many of the instructor's interactions with students are focused on evaluation of

performance rather than on providing assistance. Thus, resources tend to be directed away from teaching altogether, rather than into time with needier students.

Finally, some CBVE systems do not limit the length of time a student takes to master an objective. In these systems, individual students may demand an instructor's time for almost indefinite periods of time. (Bell, 1980, p. 18). An important component of any CBVE program is that it must find ways to ensure that students progress and do not remain in the program indefinitely.

8. CBVE programs are readily tailored to the specific objectives of individual students. They may take into account competencies acquired elsewhere and give students credit for them, rather than requiring that students proceed in a nearly lock-step manner through the entire program.

   This is clearly an advantage of the CBVE program. With competencies identified and evaluation procedures spelled out, it is easy to ascertain what a student has already mastered and to credit and place him/her appropriately. Also, the student who has a specific job in mind may be permitted to skip certain competencies and substitute others more appropriate for the particular job situation. This flexibility enables CBVE to serve individual and employment needs more readily than do regular vocational programs.

In summary, CBVE offers many potential advantages to students and to society. However, these advantages are not automatic concommitants of adopting a CBVE approach, but require careful planning to identify and overcome the difficulties implicit in CBVE. No educational innovation can be a panacea for all the ills of education.

Research Evidence on CBVE:

Despite the claims made for CBVE, one of the disturbing aspects of its massive literature is that there are few available research studies which evaluate it, after nearly ten years of active implementation of programs. Grant, completing a major study of FIPSE sponsored CBE programs in 1979 says, "We have yet seen no clear evidence that students who complete the programs are in fact more competent or employable than similar students from traditional programs. The data are just not available to make such comparisons..." (1979, p. 12). This lack is particularly disturbing since evaluation of educational innovations is a common activity. The lack of studies suggests either that people implementing CBVE have been so convinced of its effectiveness that they have felt no need to test it, or that the large majority of evaulations have found no difference between students who complete a CBVE program and those who complete other vocational programs. Whatever the case, the evidence for effectiveness and efficiency of CBVE is sparse indeed. The following summary pulls together the evidence which exists, although in all cases, the information is based on secondary sources.

Vincent and Cobb (1977) undertook a major, carefully controlled study of CBVE in secondary and post-secondary classes in Kentucky. Using a counterbalanced experimental design in which four classes in each of three occupations (tractor

mechanic, bank teller, and secretary) alternated traditional and CBVE modules, the researchers found evidence for the superiority of the CBVE approach. On cognitive skills, two thirds of the classes showed higher gain scores when using CBVE modules. All three occupational areas showed higher performance scores for CBVE modules at least some of the time. Higher performance scores occurred particularly when classes moved from traditional instruction in the first time period to CBVE instruction in the second time period. Results on performance tests may be somewhat contaminated by the fact that the final check in the CBVE module was used as the performance test in both classes. In the CBVE classes, students knew all along what they would be tested on, while in the traditional modules, they did not. Although knowledge of expectations is one of the benefits of CBVE, it is not clear that the Vincent and Cobb design is a rair way to measure the process of CBVE. Nevertheless, this study was carefully conceived and executed and does provide evidence that overall, both cognitive and performance scores are superior using CBVE.

Raphaelson, Charters, and Wachtman (1976) studied competency based education in retailing and merchandising programs at several colleges in New York. The study is based on comparisons of the performance of students who had taken traditional courses with those completing newly introduced competency based courses. They found significantly greater attainment of competencies, as measured by multiple choice tests and final written projects, for students in the CBE programs.

These two studies provide the only concrete evidence for the superiority of competency based programs with respect to student learning.

With respect to student attitudes, the evidence is more mixed. Poorman and Fleckenstein (1978) claim that students in six programs at Kirkwood Community College found competency based programs enjoyable and beneficial. However, their final report on the three year implementation project does not provide supporting evidence. On the other hand, Vincent and Cobb (197) surveyed a 25% sample of all students, faculty and administrators involved in competency based education in Kentucky. Their evidence shows that administrators are the most favorable, followed by teachers, with students rating CBVE somewhat negatively. In particular, students found the programs boring and did not want them extended to other classes.

With regard to cost-effectiveness, the Vincent and Cobb (1977) study of CBVE in Kentucky reports that CBVE programs are "inexpensive to implement in the schools' present facilities," but provides no evidence to support this generalization. At attempt to examine cost-effectiveness in a competency based nursing program at Mt. Hood Community College in Oregon was hampered by the fact that the program is twice as long as nursing programs at other nearby community colleges (Mount Hood Community College, 1974). Other studies do not provide comparative costs of CBVE and traditional programs. However, Central Community College at Hastings, Nebraska, provided statistics on the costs of their fully individualized programs compared to the traditional programs on other campuses in their system. These data indicate that the direct instructional costs per student for their programs averaged 75% of the cost of similar programs at other colleges. However, the figures do not take into account the cost of additional support personnel needed by individualized programs, such as the two proof readers employed by Hastings for preparation of learning packets.

These few studies provide only slight evidence that CBVE may be more effective and efficient than traditionally structured vocational programs, and quite mixed evidence with respect to student attitudes. Considerably more research should be done to verify that the massive time and financial resources required to implement CBVE will in fact result in improved education.

Before leaving the research on competency based education, we should point out that there is an extensive literature evaluating mastery learning, which is a core concept within CBVE. Most of this research concerns its applicability on the primary and secondary level, especially in math and sciences, and there are a variety of methodological problems. Nevertheless, Block (1974) provides an excellent review of the major findings which indicate strong support for mastery learning.

Basically, Block reports the following findings or tendencies in the literature:

1. At an 80% criterion for mastery, two to three times as many students are able to reach criterion under a mastery learning approach as under a traditional approach.

2. The greater the percentage of material learned, the greater the retention, whether material is learned by mastery techniques or not. As a result, students in mastery learning programs increase by about 15 to 20% in retention because they are expected to achieve higher levels of mastery to begin with.

3. Several studies suggest that students who have achieved mastery, particularly at the 85% to 95% levels, are more likely to be able to apply the concepts learned to a new situation.

4. Mastery of early objectives increases the probability of mastering later ones.

5. Mastery learning decreases the impact of individual differences in IQ upon ultimate learning.

6. Mastery learning tends to decrease the variability in rate of learning among students. When students are expected to master material at 80% or better before proceeding, they master each new unit more rapidly.

It is important to recall in evaluating the above findings that mastery learning primarily makes use of traditional classroom paper and pencil tests, rather than evaluation of performance on "real-life" tasks. There seems little doubt that mastery learning approaches can improve school learning and may have positive impacts upon student self concept as well. This evidence, in itself, is strong affirmation for adoption of competency based programs which incorporate mastery learning, even though evidence does not exist that CBVE program graduates make better workers or employees, or even that they graduate at higher rates.

Toward Implementation

Redefining the Task

In the first part of this paper, we looked at a definition of the components of an ideal individualized, competency-based system. The implementation of such a system in all details, would require a massive amount of effort by most of the faculty and staff of a community college over a period of several years. (Gamson, 1979, estimates a minimum of three years from inception to a working program). A decision to devote human and financial resources to such a task must be made with great caution and only upon a clear judgment that the benefits of such a system are worth these costs.

As we have seen, the arguments for CBVE, while impressive, are not without drawbacks, while the data do not provide strong support for the belief that CBVE is a significantly more effective approach to vocational preparation than the traditional approaches which now exist. As a result, a decision to make a major commitment to a wholly individualized CBVE system at this time would not be wise.

Fortunately, however, the question of adopting CBVE is not an all or nothing one. It is possible to draw upon the CBVE model for ideas to solve particular curriculum or instruction problems without making a full college commitment. For example, by offering advanced courses in a low enrollment program on an individualized CBVE basis, a college may be able to continue an AS degree which might not otherwise be feasible. Using individualized materials, instructors may be able to supervise and assist a small number of advanced students in a shop or lab while simultaneously working with students in a lower level course. Alternatively, development of CBVE individualized materials may permit some students to move ahead of the group and complete a course early, a particular advantage in subjects in which student background is quite diverse because it permits instructors to provide more attention to those students who need it.

Looked at as a package of techniques which may be drawn upon to improve instruction, CBVE is an exciting approach which can enrich education in Hawaii. The question at this time should not be whether or how to implement a full competency-based, individualized program, but whether there are concepts and procedures which can be borrowed from the CBVE model to improve instruction in our program or improve service to students.

Myths About CBVE

Before proceeding to a discussion of how to begin implementation of CBVE, let us look at some of the myths about what is involved in CBVE or why it may not work. Because most educators in Hawaii have had little or no direct contact with a CBVE college or have had contact with only one such college, there is a tendency toward stereotypic thinking about the requirements of CBVE. We tend to assume that the only way of doing things which we have heard about is the only way of doing them within CBVE. In fact, there appear to be almost as many ways of handling common problems as there are colleges which have attempted CBVE. The earlier discussion of models of CBVE was an attempt to demonstrate the diversity of approaches. In this section, we consider some of the common assumptions or myths about implementing CBVE more specifically.

1. "CBVE requires year round operation."

   Untrue. Although students may progress without interruption and better utilization is made of facilities by year round programs, having summer vacations and other breaks during the year is no more damaging to student performance in CBVE than it is in the current system.

2. "CBVE is only feasible if an entire college converts to this system."

   Again, it is probably easier to run a CBVE system if it is college wide, permitting students to move freely from one course or program to another. However, if only some courses or programs operate on a CBVE basis, students are no more inconvenienced in moving between programs than they are at present. Meanwhile, it is probably easier to develop the administrative procedures for handling CBVE by doing it in small chunks rather than by trying to create new support structures all at once.

3. "In CBVE, students can't see the forest for the trees. They have to work their way through so many miniscule tasks and competencies that they can't figure out where they're going."

   Some colleges have spelled out tasks and competencies down to an extremely detailed level. Often, these are colleges which serve large numbers of special education students as does Hennepin. However, extreme detail is not necessary to a CBVE program. Instructors should develop tasks and competencies at the level of detail they believe is appropriate to their students. It is always possible to spell out more detail later if it seems to be needed or to reduce the level of detail if the numbers of competencies feel cumbersome.

4. "CBVE requires much more paperwork than a normal program. You have to keep track of what's happening with each student."

   Actually, you have to keep track of each student in any system. At Hastings, the business faculty kept simple track of when each student attempted the mastery evaluation for each unit and the results of that evaluation informally on the back of a file card. Periodically, the instructor checked each student's card to be sure that no student was slipping too far behind a normal rate of progress. Her system was as uncomplicated as a grade book.

   As for checking student written work, it should not be necessary to check work more frequently in a CBVE program than in a regular program. Students may check their own practice work or self-assessments, with perhaps a spot check by the faculty member. Tests may be somewhat more frequent in CBVE, but since less time is spent lecturing, the total workload should not be greater.

5. "CBVE requires a much longer work week of faculty than do other approaches."

   Although Hastings and ETO both require faculty to be with students for 30 to 40 hours a week, this is not a requirement of CBVE. As administrators at Hastings pointed out, whatever number of contact hours are currently

required of faculty in a program, there is no reason why CBVE should require more. If we can do the job in the time we now devote, they claim we should be able to do it better in the same time with CBVE since CBVE is a more efficient use of instructors' time.

6. "CBVE only works with motivated students."

   It is true that CBVE turns over a great deal of responsibility to students. However, because the instructor works with students individually, she/he has greater opportunity to identify motivational problems and find ways to improve motivation. It may be that motivation is less of a problem in a CBVE class in which the instructor works to solve it than in a traditional classroom where the unmotivated student may simply get lost and disappear.

7. "Lots of students don't work well alone. CBVE would just turn them off. They come to college in part for social contact and want or need group support."

   This can be a real problem, but it can also be solved. At Hastings, many students got to know no one. However, the departments are trying to remedy the situation by setting up student lounges, student clubs, and activities in the program areas to bring together those students who want or need more social interaction. Also, it is possible to build group activities or require students to work together. ETO business programs use mini-seminars to introduce new topics. The Hastings automotive program requires students to work in pairs because of equipment limitations. However, the college also finds that this is a more effective approach to learning than the individual approach used previously. If group work seems to be important to maintain student interest, it should be built into the program, even if this somewhat limits the individualization of the program.

8. "Our students would get lost if they started out in a CBVE program. They don't have the discipline or skills to work without a lot of encouragement."

   Most CBVE programs provide a lot of individual attention to students at the beginning — going through the study guide with students, orienting them to the availability of materials and equipment, helping them learn how to learn through CBVE. Since most students will enter at the beginning of a semester, much of this orientation can be done in groups; later, it can be done individually with students who enroll later in the semester. After the orientation phase, the faculty member must be attentive to individual needs. Some students may need a good deal of hand holding and should get it. Others will be ready to proceed independently rather quickly.

9. "Our students couldn't learn on their own just by watching a video-tape or reading a book."

   This is true of most students everywhere. The instructor needs to include in the study guide anything she/he can think of to help direct students' attention to what they should be learning. At SOCJC, some instructors

prepared a self-test of video-taped lectures which was virtually an outline of important points in the lecture. Students could fill in the questionnaire after watching the tape or as they went along. They could even backtrack and check on something they had missed by listening again. At the end, they had an outline in their own words of the significant things they were expected to know.

10. "You just can't take an individualized approach to every topic or activity."

    This may be true, but as the Dean of Instruction at Hastings pointed out, it helps to assume it is false. If a problem occurs in the design or implementation of a course, first look for what can be done. The quality of education should take precedence over the "purity" of a CBVE system, so modifications should take place when they are necessary. For example, at Hastings, speech courses are individualized but all of them require that students give speeches to an audience and lead and participate in group discussions. In regular speech classes, the class provides the audience and the discussion groups. At Hastings, students in the same room at the same time may be working on four different courses. However, each course requires them to participate in group activities and critique speeches. Therefore, whenever a student is ready to give a speech or lead a discussion, other students in the room are called together to provide an audience or discussion group for which they receive "participation points" toward their own courses. With a little ingenuity and flexibility, a basic CBVE structure can accommodate most learning needs.

How to Begin

The most important requirements for implementation of CBVE, even in only one course or program, are commitment on the part of the faculty involved and strong support from their administrators. In general, administrators have been more enthusiastic about CBVE than have faculty (Bell, 1980, p.14). It is important to remember that CBVE is primarily a curricular modification, not an administrative one, and in the University of Hawaii system, Board of Regents' policy gives faculty priority in determining curriculum matters. This policy exists for a good reason: faculty who do not support a curriculum change are unlikely to be effective instructors in that curriculum. Therefore, it would be most unwise for administrators to attempt to impose a conversion to CBVE.

However, there are many things which administration can do to encourage faculty to think seriously about the advantages of CBVE: workshops and training programs, visits to CBVE programs elsewhere, contact with experienced CBVE personnel from other systems (perhaps through exchange programs), etc. In addition, administrators can encourage faculty to review their courses to determine the extent to which their curricula are already competency based, even where they are not individualized. Finally, released time resources may be earmarked for faculty who are willing to take the plunge. For instructors ready to begin, here are some suggestions on how to develop a CBVE course or program:

1. An instructor beginning a CBVE course should first analyze the course outline, syllabus and other materials to identify the competencies around which the course in already organized. Most vocational programs already focus on competencies, whether explicitly or implicitly.

2. Competencies identified should be validated for currency, preferably with an advisory committee or industry representatives.

3. Identify how students currently acquire each competency — what do they learn by reading, by other AV materials, from lectures, from demonstrations by the instructor, from practice exercises, from helping each other, etc.? These means of learning provide the resources already present. All of them may be used in a CBVE program although the instructor will probably want to find another way of presenting the lectures and perhaps also demonstrations (through written materials, video tape demonstrations, audio-tape lectures, etc.).

4. (Optional) Review materials available nationally. If the instructor can find AV materials which say what she/he wants them to say, it will save the trouble of developing them locally. However, most faculty will find that they prefer their own approach to the subject. The point of reviewing national materials, then, is in part to see how other instructors have handled the same topics and to get ideas for locally developed AV materials.

5. Develop materials to replace lectures, and wherever possible, demonstrations. Where student reading ability is good, written material may suffice. Use video tapes for demonstrations in which motion is important. Use audio tapes, perhaps supplemented by photographs, film strips, or slides when motion is not important. This step is potentially the most costly and time consuming. It is, however, possible to begin an individualized program still utilizing mini-lecturers and demonstrations to small groups of students. In the long run, this is not efficient use of the instructor's time and tends to work against individualization, but as a way of starting prior to developing all the needed materials, it may be desirable.

6. Develop evaluation procedures for the competency objectives. These must be spelled out clearly, including the conditions under which evaluation will take place and the criterion to be achieved. The number of evaluations necessary within a course will vary by the course, the instructor, and the needs of the students. Attention should be given to whether the same evaluation procedure can be repeated more than once by a student. For example, typing speed may be measured on three or more equivalent sets of copy to be typed, whereas to repeat the evaluation on the same copy over and over would reduce the validity of the test. In general, the course should be planned so that students can be evaluated on the same competency up to three times.

7. Ideally, the evaluation procedures and criteria should be reviewed by the advisory committee to ascertain whether the procedures and standards are satisfactory approximations of work requirements.

8. Develop a learning packet. This need not be fancy. It should contain a statement of course objectives, the means by which measurement of objectives will be done, and a step-by-step set of directions telling the student how to attain the objective.

Although these steps to developing a CBVE course may not be quite as simple as they look on paper, they are probably not quite as difficult as has often been assumed. Much of the work has already been done by any good instructor in developing the courses she or he now teaches.

Mechanics of Implementing CBVE

In this section, we will deal with the modifications which must be made in current campus procedures in order to implement CBVE courses. It is assumed that initial implementation will involve converting individual courses to CBVE rather than converting an entire program or an entire college. Therefore, procedures need to be kept as close as possible to ones already in effect. It should be pointed out that most campuses already have courses operating on a CBVE basis so that many of the conversion problems have already been solved.

If competency-based vocational education is introduced without open entry-open exit classes, no modifications need be made in the college procedures to accommodate the change. Students will be admitted as usual and faculty workload will continue as at present. Instructors will schedule classes to permit enrollment of students in only one class during a time slot rather than the many classes which instructors in fully individualized programs deal with at once. If, however, open-entry classes are introduced with instructors working with students in several courses simultaneously, a number of modifications will need to be made in college policies and procedures. Fortunately, none of these appear to be prohibitive. The discussion below assumes open admission to courses, but retention of the semester system of organization.

1. Admissions. For CBVE courses, it is desirable for students to enter the course at any time during the academic year. This means that procedures need to be developed for an exception to the admissions deadline for CBVE courses and this exception must be publicized. Counselors need to be prepared to assist students wanting to enroll mid-semester in these courses.

2. Tuition and Fees. Students would pay for the number of credits for which they enroll during a semester as they do now even though they may not begin classes at the beginning of a semester. Students completing one CBVE course for which they have enrolled and wanting to begin another before the end of a semester could enroll late or simply begin work on the new course and enroll and pay for it in the next semester. Provision would be desirable to waive late registration fees for CBVE students, though it is not absolutely necessary to do so. Other fees could be pro-rated on a credit basis as they are at present.

3. Determination of Full-Time Status. Students at Hastings are considered to be full-time students for VA and financial aid purposes if they enroll for at least one credit for each remaining week of the semester, up to a total of 12 credits. This procedure should work well for Hawaii.

4. Refund Policy. The schedule of refunds for dropping courses could continue to be administered as at present but would apply to the number of weeks after the student enrolled rather than the number of weeks from the beginning of the semester.

5. Variable Credit. A CBVE system is greatly enhanced if students are able to enroll for fewer credits than the entire course (for example, to enroll for only 4 credits in a 6-credit course) especially when the student is entering mid-semester. Also, it is desirable for students to be able to receive greater credit than they enrolled for (e.g., if the student in the example above who had enrolled for 4 credits completed 5 credits worth of work before the end of the semester). Apparently, variable credit is currently being used in both of these ways within the community colleges.

6. Faculty Teaching Load. Faculty should be assigned the same number of contact hours for instruction as they currently put in for a given course. The workload calculation should be based on what is necessary for a lecture/lab course at present rather than converting to an all lab means of computing workload. In other words, conversion to CBVE should not require instructors to spend any more or less time with students than does their current approach to instruction. If an entire program or several courses within it have been individualized according to CBVE, the instructor should be assigned the same number of contact hours as at present, even though the number of courses available to students may be greater than at present. The number of students to be handled by one instructor would then be determined on the basis of the number of work stations available and the ability of an instructor to provide individual attention to the students, not on the basis of minimum class sizes for each of the classes offered simultaneously.

7. Reporting Systems. Our current systems for reporting comparative data between campuses do not accommodate current attempts at individualization and would encounter similar problems with new CBVE courses or programs.

   Enrollment. Official enrollment figures are based on enrollment in a college after six weeks. This reporting system would omit students who enter later in the semester. At present, the number of late enrollees would probably not be great, but if an entire program moves to CBVE or a campus makes a major commitment to CBVE for several programs, it would be necessary to have a new way of reporting enrollment — probably by final enrollment at the end of the semester. Although such figures would not be technically comparable with those of previous years, a change to CBVE would necessarily disrupt the accuracy of such inter-year comparisons of all statistics.

   SSH Attempted/Received. These statistics would also be more meaningful if given at the end of the semester. Variable credit would also affect the precise meaning of these data.

   Average Class Size. If only one course becomes CBVE, this figure is not affected. However, if several classes are individualized and are available to students during the same time period with the same instructor, the number of students served per time period would be more meaningful than the number per class. This is how current "piggy-back" courses are treated and should pose no new problems.

Number of Courses, Classes, SH Offered/Semester. These data would not be affected by the conversion of one course. But the conversion of an entire program would mean that all courses in the program were offered at all times. Therefore, data from CBVE programs could not be calculated with other such data and a new reporting means may have to be developed.

8. Policy on Student Academic Progress. CBVE colleges have found it important to have a clear policy on the normal standard of academic progress expected of students in order to prevent students from unduly prolonging their programs and taking up space which other students might use.

Summary and Conclusions

Competency based education has commanded considerable national attention in recent years as a promising approach to improving both the quality and the accountability of education. Despite these impressive claims, CBVE is not a cure-all for the ills of education. As with any educational innovation, CBVE appears to bring new problems in its wake, even as it makes substantial progress toward solving old ones.

This paper has attempted to examine the claims made for CBVE, using both research evidence and theoretical analysis. In addition, we have looked at the antecedents of CBVE and at model institutions currently implementing CBVE. Lastly, we have considered some of the modifications which would need to be made in procedures in the University of Hawaii Community Colleges to implement such programs here.

The results of this investigation do not provide a clear-cut answer to whether CBVE should be implemented in Hawaii. Complete conversion to a CBVE program at any college would take several years of major efforts by faculty and require a major investment in media materials and supplies--paper and photographs at a minimum, and an array of film-strip, video and other production and viewing equipment at a maximum. Whether the benefits of a CBVE program would warrant these initial investments of time and resources is far from clear. Research on the effectiveness of CBVE fails to provide convincing proof of its superiority (although substantial evidence does exist for the superiority of mastery learning, which is a crucial component of CBVE). Some evidence exists that CBVE may be more cost-effective than traditional programs after the initial implementation period, but no thorough study has in fact been done. However, an examination of CBVE in practice at several model institutions provides impressive testimony to the workability of CBVE and to the creativity of faculty in coping with some of the more difficult problems in implementation.

On balance, we conclude with a very cautious positive assessment of the potential of CBVE for Hawaii. Although it would not be prudent to undertake a major conversion to this approach, experimentation within selected programs is highly desirable. Administrators should keep in mind that national research indicates more enthusiasm for CBVE among administrators than among the faculty who must teach in these programs and the students who must learn. Therefore, they should avoid pushing reluctant faculty, but rather encourage those faculty who wish to experiment by providing opportunities to visit and work with CBVE

programs, inviting faculty from mainland programs to serve as consultants in moving toward CBVE in selected programs, and providing released time from other responsibilities for those faculty who agree to develop the necessary materials for implementing CBVE in their courses. Perhaps even more importantly, administrators need to be ready to support the inevitable trial and error involved in establishing a new approach to instruction without expecting completely positive results from the beginning.

Competency based education probably will not revolutionize education in Hawaii, at least not in the immediate future. Nevertheless, the basic processes of CBVE--job analysis, statement of competencies to be learned and evaluation means to be employed, and organization of instruction around these competencies--are basic processes for the design of curriculum and instruction which are appropriate at all times, whether or not a college decides to individualize instruction or implement mastery learning techniques or multiple instructional media. The systematic approach to education which underlies CBVE deserves to be taken seriously by all educators.

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